

## GaAs MMIC SMT DOUBLE-BALANCED FET MIXER, 1.3 - 2.5 GHz

### Typical Applications

The HMC216MS8 is ideal for:

- Base Stations
- WirelessLAN
- PCMCIA
- Portable Wireless

### Features

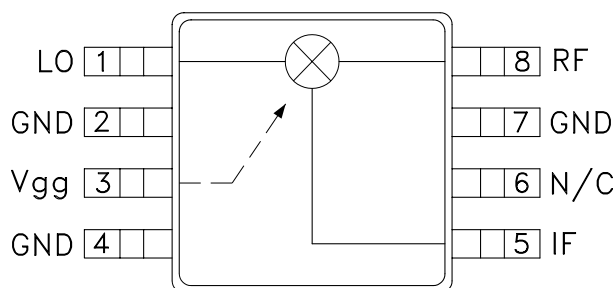
IP3 (Input): +25 dBm @ +11 dBm LO

LO Range = +3 to +11 dBm

Conversion Loss: 8.5 dB

LO / RF Isolation: 32 dB

### Functional Diagram



### General Description

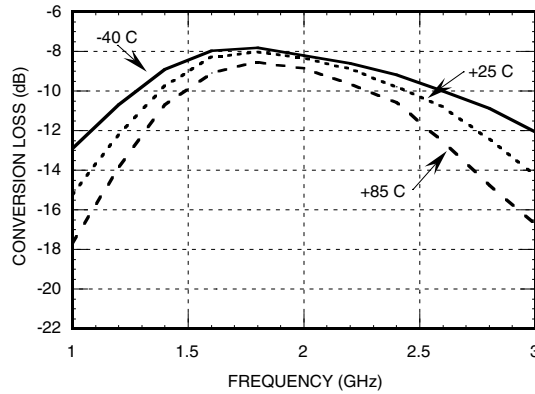
The HMC216MS8 is an ultra miniature double-balanced FET mixer in an 8 lead plastic surface mount package (MSOP). This MMIC mixer is constructed of switched GaAs FETs and novel planar transformer baluns on the chip. In addition to an LO drive of +3 to +13 dBm, a gate voltage of  $V_{gg} = -0.9$  to  $-1.6$  Vdc is required. The device can be used as an upconverter or downconverter for 1900 or 2400 MHz applications. The consistent MMIC performance will improve system operation and assure regulatory compliance.

### Electrical Specifications, $T_A = +25^\circ\text{C}$ , As a Function of LO Drive, $V_{gg} = -1.2\text{ Vdc}$

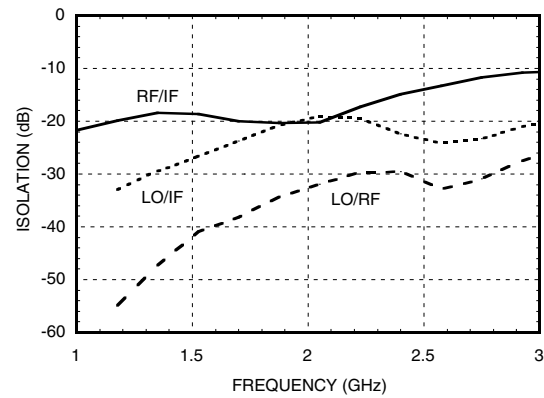
Parameter	LO = +11 dBm			LO = +7 dBm			LO = +3 dBm			Units
	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
Frequency Range, RF & LO	1.3 - 2.5			1.6 - 2.3			1.7 - 2.0			GHz
Frequency Range, IF	DC - 0.65			DC - 0.5			DC - 0.4			GHz
Conversion Loss		9	10.5		8.5	10		9	10.5	dB
Noise Figure (SSB)		9	10.5		8.5	10		9	10.5	dB
LO to RF Isolation	27	30		27	32		27	32		dB
LO to IF Isolation	17	20		17	20		17	20		dB
IP3 (Input)	21	25		14	18		8	12		dBm
1 dB Gain Compression (Input)	8	11		5	10		3	8		dBm

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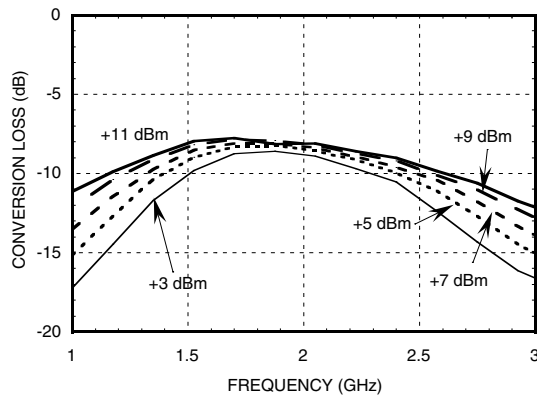
**Conversion Loss vs  
Temperature @ LO = +7 dBm**



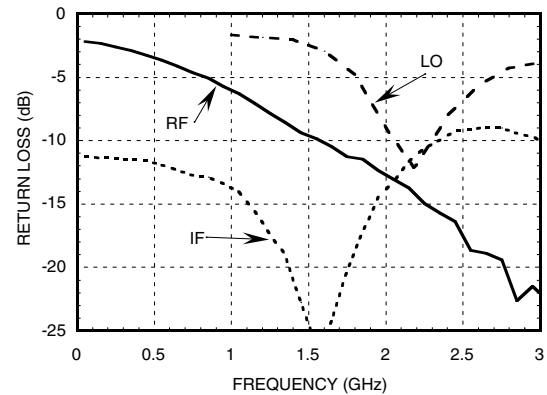
**Isolation @ LO = +7 dBm**



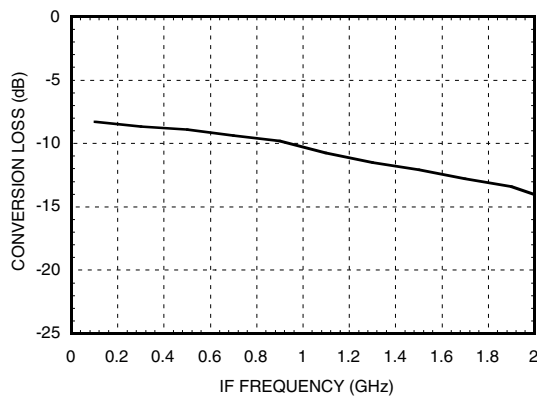
**Conversion Loss vs. LO Drive**



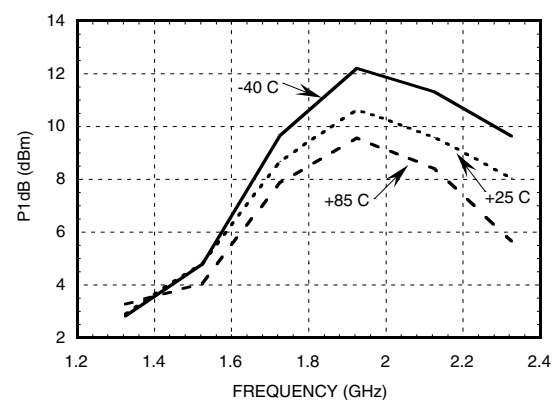
**Return Loss @ LO = +7 dBm**



**IF Bandwidth @ LO = +7 dBm**

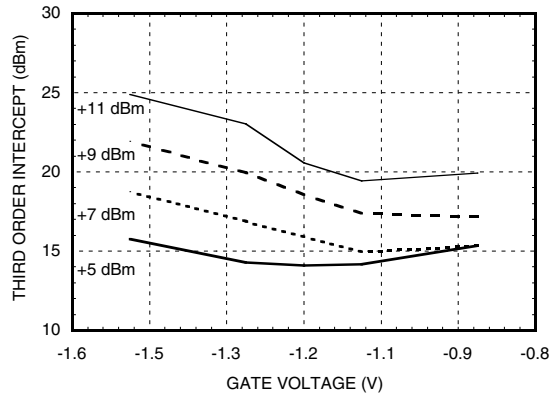


**P1dB vs. Temperature for  
LO = +7 dBm, V<sub>gg</sub> = -1.2 Vdc**

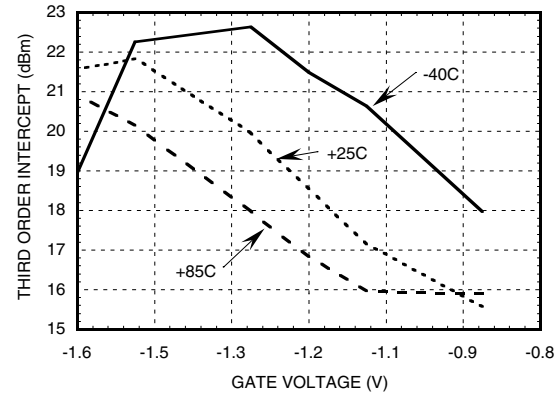


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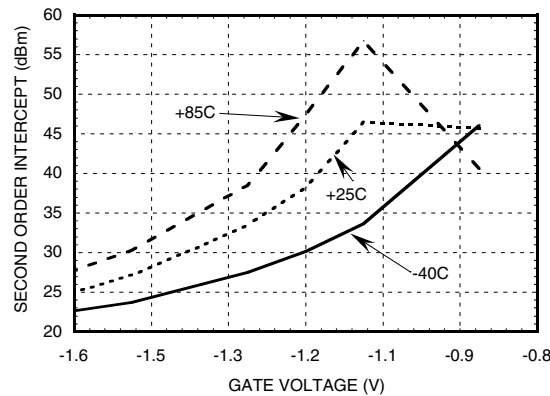
**Input IP3 vs. LO Drive and V<sub>gg</sub>**



**Input IP3 vs. Temperature and V<sub>gg</sub> for @ LO = +7 dBm**



**Input IP2 vs. Temperature and V<sub>gg</sub> for @ LO = +7 dBm**



**M<sub>x</sub>N Spurious Outputs**

mRF	nLO				
	0	1	2	3	4
0	xx	-1	14	24	40
1	14	0	28	21	46
2	45	45	59	55	50
3	83	67	62	59	77
4	>105	>105	>105	85	96

RF = 1.975 GHz @ -10 dBm  
LO = 1.8 GHz @ +7 dBm, V<sub>gg</sub> = -1.2V  
All values in dBc below IF power level (-1RF + 1LO).

**Harmonics of LO**

LO Freq. (GHz)	nLO Spur at RF Port			
	1	2	3	4
1.5	41	47	61	78
1.7	38	47	72	71
1.9	34	41	69	72
2.1	31	37	72	79
2.3	29	38	74	74
2.5	32	45	65	74

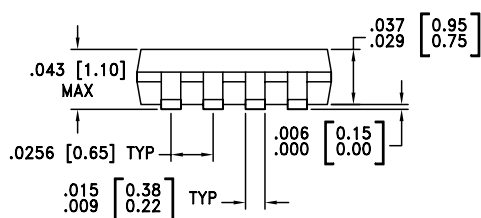
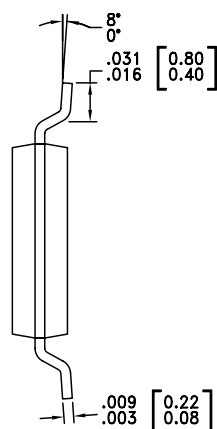
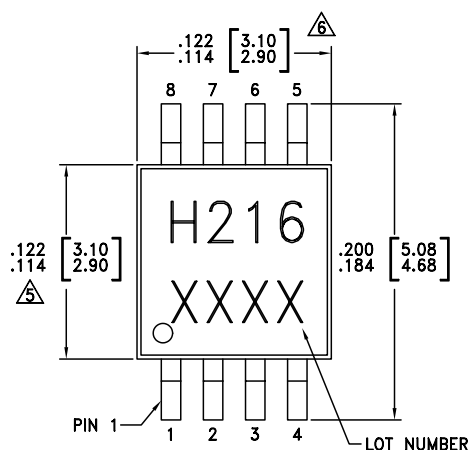
LO = +7 dBm, V<sub>gg</sub> = 1.2V  
Values in dBc below input LO level measured at the RF port.

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### Absolute Maximum Ratings

RF / IF Input	+13 dBm
LO Drive	+27 dBm
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C

### Outline Drawing

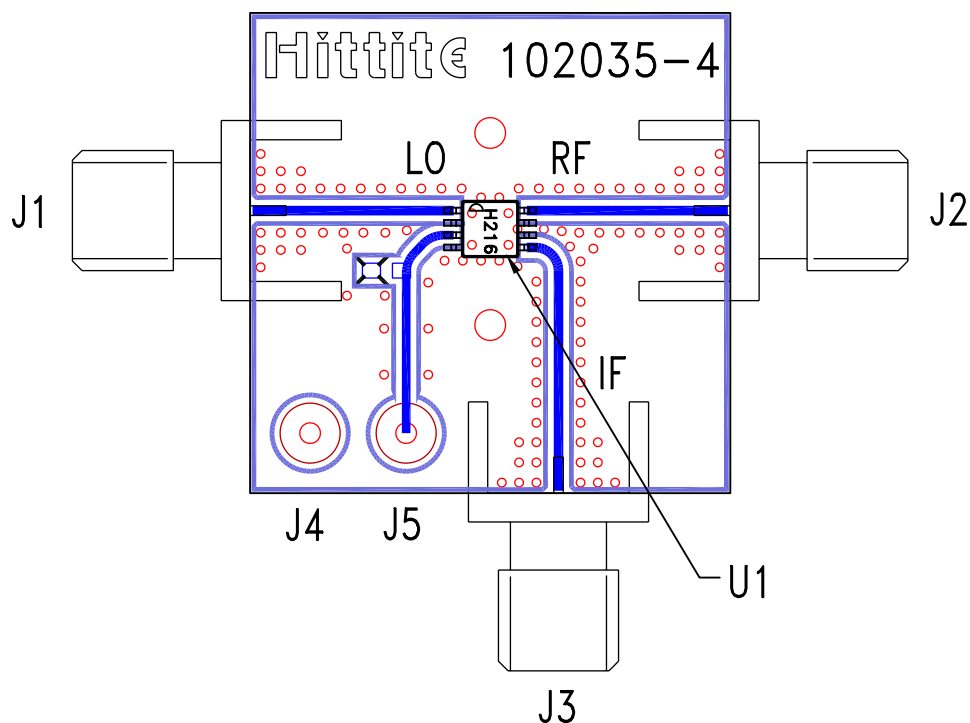


#### NOTES:

1. PACKAGE BODY MATERIAL: LOW STRESS INJECTION MOLDED PLASTIC SILICA AND SILICON IMPREGNATED.
2. LEADFRAME MATERIAL: COPPER ALLOY
3. LEADFRAME PLATING: Sn/Pb SOLDER
4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
6. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
7. ALL GROUND LEADS MUST BE SOLDERED TO PCB RF GROUND.

## GaAs MMIC SMT DOUBLE-BALANCED FET MIXER, 1.3 - 2.5 GHz

### Evaluation Circuit Board



### List of Material

Item	Description
J1 - J3	PC Mount SMA RF Connector
J4, J5	DC Pin
U1	HMC216MS8 Mixer
PCB*	102035 Evaluation Board
* Circuit Board Material: Rogers 4350	

The circuit board used in the final application should use RF circuit design techniques. Signal lines should have 50 ohm impedance while the package ground leads should be connected directly to the ground plane similar to that shown. A sufficient number of VIA holes should be used to connect the top and bottom ground planes. The evaluation circuit board shown is available from Hittite upon request.

## ***GaAs MMIC SMT DOUBLE-BALANCED FET MIXER, 1.3 - 2.5 GHz***

### ***Notes:***